AMERICAN SOCIETY OF PENSION PROFESSIONALS & ACTUARIES
JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES
SOCIETY OF ACTUARIES

Enrolled Actuaries Basic Examination

EA-1

Date: Tuesday, May 11, 2010
Time: 8:30 a.m. – 11:00 a.m.

INSTRUCTIONS TO CANDIDATES

1. Write your candidate number here _____. Your name must not appear.
2. Do not break the seal of this book until the supervisor tells you to do so.
3. Special conditions generally applicable to all questions on this examination are found at the front of this book.
4. On this examination the symbol "a" will be used to represent an annuity. On this examination the symbol "ℓ_x" will be used to represent the number of lives at age x.
5. This examination consists of 31 multiple-choice questions worth a total of 100 points. The point value for each question is shown in parentheses at the beginning of the question.
6. Your score will be based on the point values of questions that you answer correctly. No credit will be given for omitted answers and no credit will be lost for wrong answers; hence, you should answer all questions even those for which you have to guess.
7. A separate answer sheet is inside the front cover of this book. During the time allotted for this examination, record all your answers on side 2 of the answer sheet. NO ADDITIONAL TIME WILL BE ALLOWED FOR THIS PURPOSE. No credit will be given for anything indicated in the examination book but not transferred to the answer sheet. Failure to stop writing or coding your answer sheet after time is called will result in the disqualification of your answer sheet or further disciplinary action.
8. Five answer choices are given with each question, each answer choice being identified by a key letter (A to E). For each question, blacken the oval on the answer sheet that corresponds to the key letter of the answer choice that you select.
9. Use a soft-lead pencil to mark the answer sheet. To facilitate correct mechanical scoring, be sure that, for each question, your pencil mark is dark and completely fills only the intended oval. Make no stray marks on the answer sheet. If you have to erase, do so completely.
10. Do not spend too much time on any one question. If a question seems too difficult, leave it and go on.
11. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.
12. Clearly indicated answer choices in the test book can be an aid in grading examinations in the unlikely event of a lost answer sheet.
13. Use the blank portions of each page for your scratch work. Extra blank pages are provided at the back of the examination book.
14. When the supervisor tells you to do so, break the seal on the book and remove the answer sheet.

    On side 1 of the answer sheet, space is provided to write and to code candidate information. Complete Blocks A through G as follows:

    (a) in Block A, print your name and the name of this test center;

    (b) in Block B, print your last name, first name and middle initial and code your name by blackening the ovals (one in each column) corresponding to the letters of your name; for each empty box, blacken the small rectangle immediately above the "A" oval;

    (c) write your candidate number in Block C (as it appears on your ticket of admission for this examination) and write the number of this test center in Block D (the supervisor will supply the number);

    (d) code your candidate number and center number by blackening the five ovals (one in each column) corresponding to the five digits of your candidate number and the three ovals (one in each column) corresponding to the three digits of the test center number, respectively. Please be sure that your candidate number and the test center number are coded correctly;

    (e) in Block E, code the examination that you are taking by blackening the oval to the left of "Course EA-1."

    (f) in Block F, blacken the appropriate oval to indicate whether you are using a calculator; and

    (g) in Block G, sign your name and write today's date. If the answer sheet is not signed, it will not be graded.

    On side 2 of your answer sheet, space is provided at the top for the number of this examination book. Enter the examination book number, from the upper right-hand corner of this examination book, in the four boxes at the top of side 2 marked "BOOKLET NUMBER."
15. After the examination, the supervisor will collect this book and the answer sheet separately. DO NOT ENCLOSE THE ANSWER SHEET IN THE BOOK. All books and answer sheets must be returned. THE QUESTIONS ARE CONFIDENTIAL AND MAY NOT BE TAKEN FROM THE EXAMINATION ROOM.

EA-1 Spring 2010

Answer Key

Question	Points	Solution
1	3	E
2	3	C
3	3	B
4	3	B
5	3	C
6	4	B
7	4	C
8	2	A
9	5	C
10	3	D
11	3	B
12	4	D
13	3	B
14	4	C
15	3	B
16	2	D
17	3	D
18	3	D
19	5	A
20	3	D
21	3	E
22	2	A
23	3	D
24	3	B
25	3	C
26	3	C
27	2	E
28	3	C
29	4	C
30	4	B
31	4	C

CONDITIONS GENERALLY APPLICABLE TO ALL EA-1 EXAMINATION QUESTIONS

If applicable, the following conditions should be considered a part of the data for each question, unless otherwise stated or implied:

(1) The normal retirement age is 65.

(2) Retirement pensions commence at normal retirement age and are paid monthly for life at the beginning of each month.

(3) There are no pre-retirement death or disability benefits.

(4) Actuarial equivalence is based on the mortality table and interest rate assumed for funding purposes.

(5) Interest rates that are compounded more frequently than annually are expressed as nominal rates.

(6) Where multiple lives are involved, future lifetimes are assumed to be independent of each other.

(7) The term "gross single premium" is equivalent to "contract single premium;" the term "net single premium" is equivalent to "single benefit premium;" the term "gross annual premium" is equivalent to "annual contract premium;" the term "net annual premium" is equivalent to "annual benefit premium."

(8) There are no policy loans in effect.

(9) For a bond, the face amount and the redemption value are the same.

(10) Interest rate equals yield rate.

(11) The term "duration" means "Macaulay duration".

****BEGINNING OF EXAMINATION****

Data for Question 1 (3 points)

Fund balance as of 1/1/2010:	$12,000.
Deposits to the fund:	60 deposits of $100 on the last day of each month with the first deposit made on 1/31/2010.
Withdrawals from the fund:	20 withdrawals of $1,000 on the first day of each quarter beginning 1/1/2017.
Interest rate:	8.0% per year, compounded monthly.

X = the fund balance as of 12/31/2021.

Question 1

In what range is X?

(A) Less than $13,500

(B) $13,500 but less than $15,000

(C) $15,000 but less than $16,500

(D) $16,500 but less than $18,000

(E) $18,000 or more

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Data for Question 2 (3 points)

Selected annuity values:

x	$\ddot{a}_x$
50	12.0787
51	11.9212
52	11.7585

Interest rate: 7.0% per year, compounded annually.

$\boldsymbol{X}$ = the probability an annuitant age 50 dies before age 52.

Question 2

In what range is $\boldsymbol{X}$?

(A) Less than 0.005

(B) 0.005 but less than 0.010

(C) 0.010 but less than 0.015

(D) 0.015 but less than 0.020

(E) 0.020 or more

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Data for Question 3 (3 points)

Smith (age 65) has a spouse (age 60) as of 1/1/2010.

Smith is scheduled to commence a life annuity of $1,000 per month beginning on 1/1/2010.

Instead of receiving this life annuity, Smith elects the actuarially equivalent benefit commencing 1/1/2010 described below:

X per month while both Smith and Smith's spouse are alive, plus

X per month to Smith's spouse for life after Smith's death, plus

$1,000 per month to Smith for life after Smith's spouse's death.

Selected actuarial values:

$$\ddot{a}_{60}^{(12)} = 12.176$$
$$\ddot{a}_{65}^{(12)} = 10.194$$
$$\ddot{a}_{60:65}^{(12)} = 8.023$$

Question 3

In what range is ***X***?

(A) Less than $650

(B) $650 but less than $700

(C) $700 but less than $750

(D) $750 but less than $800

(E) $800 or more

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Data for Question 4 (3 points)

$\ell_x = 110 - x, \quad 0 \le x \le 110$

Interest rate: 7.0% per year, compounded annually.

Question 4

In what range is $\ddot{a}_{65}$?

(A) Less than 10.60

(B) 10.60 but less than 11.60

(C) 11.60 but less than 12.60

(D) 12.60 but less than 13.60

(E) 13.60 or more

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Data for Question 5 (3 points)

A club has maintained a stationary population of 5,000 members during the last 30 years. A person can join only at age 30 and must resign at age 60 if still a member.

There are 100 total terminations per year before age 60. The average age at termination is 35.

$\boldsymbol{X}$ = the number of new members each year during the last 30 years.

Question 5

In what range is $\boldsymbol{X}$?

(A) Less than 170

(B) 170 but less than 220

(C) 220 but less than 270

(D) 270 but less than 320

(E) 320 or more

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Data for Question 6 (4 points)

Selected annuity values:

$$\ddot{a}_{20} = 14.79$$
$$\ddot{a}_{50} = 12.56$$
$$\ddot{a}_{65} = 9.70$$
$$\ddot{a}_{20:50} = 12.51$$
$$\ddot{a}_{20:65} = 9.68$$
$$\ddot{a}_{50:65} = 9.48$$
$$\ddot{a}_{20:50:65} = 9.44$$

Question 6

In what range is $\ddot{a}_{65|\,\overline{20:50}}$?

(A) Less than 5.0

(B) 5.0 but less than 6.0

(C) 6.0 but less than 7.0

(D) 7.0 but less than 8.0

(E) 8.0 or more

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Data for Question 7 (4 points)

Terms of a bond:

Issue date	1/1/2003
Term	15 years
Par value	$10,000
Coupons	8.0% per year, paid on 6/30 and 12/31
Amortized value on 7/1/2010	$13,741
Amortized value on 1/1/2011	$13,630

X = the redemption amount to be paid upon maturity.

Question 7

In what range is ***X***?

(A) Less than $11,680

(B) $11,680 but less than $11,750

(C) $11,750 but less than $11,820

(D) $11,820 but less than $11,890

(E) $11,890 or more

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Data for Question 8 (2 points)

Terms of a perpetuity:

Purchase date 1/1/2001

Date of first payment 12/31/2001

Frequency of payments Annual

Amount of each payment $1.00

Interest rate 6.0% per year, compounded annually

A = the modified duration of the perpetuity

B = the present value of the perpetuity

Question 8

In what range is $|\boldsymbol{A} - \boldsymbol{B}|$?

(A) Less than 0.20

(B) 0.20 but less than 0.40

(C) 0.40 but less than 0.60

(D) 0.60 but less than 0.80

(E) 0.80 or more

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Data for Question 9 (5 points)

Under a pension plan's actuarial equivalence definition:

Interest rate	7.0%, compounded annually
q_x	0.04 for $x \geq 70$

Under the plan, there are two actuarially equivalent forms of payment:

Form A:	10 years certain and payments for life thereafter
Form B:	Payments of $\boldsymbol{X}$ while the participant and spouse are both alive.
	Payments of 110% of $\boldsymbol{X}$ to participant after the death of spouse.
	Payments of 50% of $\boldsymbol{X}$ to spouse after the death of participant.

Payments are made annually at the beginning of each year.

For a participant age 72 with a spouse age 75, the benefit amount under Form A is \$100.

Question 9

In what range is $\boldsymbol{X}$ for this participant?

(A) Less than \$86

(B) \$86 but less than \$92

(C) \$92 but less than \$98

(D) \$98 but less than \$104

(E) \$104 or more

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Data for Question 10 (3 points)

All assets of a pension plan are invested by manager Smith and manager Jones. There are no other plan assets.

The following chart shows the market values of the plan's assets with each manager:

	Date	Smith	Jones
Balance	12/31/2009	$2,500,000	$2,500,000
Contribution	1/1/2010	0	1,500,000
Balance	6/30/2010	2,800,000	4,500,000
Transfer	7/1/2010	1,000,000	(1,000,000)
Balance	12/31/2010	4,180,000	3,500,000

X = one-half of the sum of both managers' time-weighted percentage returns for 2010.

Y = dollar-weighted percentage return for 2010 for the entire pension plan.

Question 10

In what range is $|Y-X|$?

(A) Less than 0.09%

(B) 0.09% but less than 0.18%

(C) 0.18% but less than 0.27%

(D) 0.27% but less than 0.36%

(E) 0.36% or more

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Data for Question 11 (3 points)

Data from a select and ultimate mortality table:

x	$\ell_{[x]}$	$\ell_{[x+1]}$	$\ell_{[x+2]}$	ℓ_{x+3}	$x+3$
27	93,347	93,215	93,052	92,863	30
28	93,149	93,016	92,849	92,656	31
29	92,948	92,812	92,642	92,443	32
30	92,742	92,604	92,429	92,222	33
31	92,543	92,403	92,224	92,012	34

For purposes of performing a pension valuation, the plan's actuary applies a one-year age setback to the above table. Assume no other pre-retirement decrements apply.

X= the probability, calculated for the pension valuation, that a newly-hired participant, hired at age 29, dies during his third or fourth year of employment.

Question 11

In what range is ***X***?

(A) Less than 0.0043

(B) 0.0043 but less than 0.0044

(C) 0.0044 but less than 0.0045

(D) 0.0045 but less than 0.0046

(E) 0.0046 or more

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Data for Question 12 (4 points)

At normal retirement (age 60), a pension plan provides three actuarially equivalent optional forms of payment:

Form A: A lifetime annuity paying $1,000 per month

Form B: A 5-year certain and life annuity paying $\boldsymbol{X}$ per month

Form C: A 5-year certain and life annuity paying ($\boldsymbol{X}$+300) per month for the first 36 months and $\boldsymbol{Y}$ per month thereafter

All payments are made at the beginning of the month.

Selected actuarial factors:

$$\ddot{a}_{60}^{(12)} = 11.53$$
$$_{3|}\ddot{a}_{60}^{(12)} = 8.83$$
$$_{5|}\ddot{a}_{60}^{(12)} = 7.35$$

Interest rate: 7.0% per year, compounded annually.

Question 12

In what range is $\boldsymbol{Y}$?

(A) Less than $873

(B) $873 but less than $883

(C) $883 but less than $893

(D) $893 but less than $903

(E) $903 or more

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Data for Question 13 (3 points)

Amount of loan:	$10,000.
Term of loan:	20 years.
Interest rate on loan:	5.0% per year.
Terms of loan repayment:	20 annual payments at the end of the year beginning with year 1 consisting of $500 principal plus interest on the outstanding balance of the loan.

Question 13

In what range is the total amount of interest paid over the term of the loan?

(A) Less than $5,000

(B) $5,000 but less than $5,400

(C) $5,400 but less than $5,800

(D) $5,800 but less than $6,200

(E) $6,200 or more

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Data for Question 14 (4 points)

Participant age on 1/1/2010:	65.
Joint annuitant age on 1/1/2010:	64.
Interest rate:	7.0%, compounded annually.
Joint annuity terms:	Lifetime payments of \$10,000 annually at the beginning of the year with the first payment at 1/1/2010. Upon the first death of the participant or joint annuitant, the payment decreases to \$6,000 and this amount is payable until the second death.

Selected values:

$$1000q_{64} = 8.685$$
$$1000q_{65} = 9.816$$
$$a_{65} = 9.8207$$
$$a_{64:65} = 8.4129$$

Question 14

In what range is the present value of the annuity on 1/1/2010?

(A) Less than \$95,000

(B) \$95,000 but less than \$105,000

(C) \$105,000 but less than \$115,000

(D) \$115,000 but less than \$125,000

(E) \$125,000 or more

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Data for Question 15 (3 points)

Given the following values:

x	e_x
107	0.60
108	0.20
109	0.00

A new table is constructed such that the force of mortality at each age is doubled.

Y = the value of e_{107} from the new table.

Question 15

In what range is ***Y***?

(A) Less than 0.25

(B) 0.25 but less than 0.27

(C) 0.27 but less than 0.29

(D) 0.29 but less than 0.31

(E) 0.31 or more

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Data for Question 16 (2 points)

You are given the following cash flows:

Date of Payment	Amount of Payment
12/31/2010	$ 10,000
12/31/2012	20,000
12/31/2013	15,000

X= the duration as of 1/1/2010 of the above cash flows, measured at 6.0% interest, compounded annually.

Question 16

In what range is ***X***?

(A) Less than 2.72

(B) 2.72 but less than 2.76

(C) 2.76 but less than 2.80

(D) 2.80 but less than 2.84

(E) 2.84 or more

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Data for Question 17 (3 points)

$$_{15}p_{25} = 0.8108$$
$$_{15|15}q_{25} = 0.2027$$
$$_{10}q_{55} = 0.2222$$

Question 17

In what range is $_{30|10}q_{25}$?

(A) Less than 0.015

(B) 0.015 but less than 0.065

(C) 0.065 but less than 0.115

(D) 0.115 but less than 0.165

(E) 0.165 or more

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Data for Question 18 (3 points)

Terms of a loan:

Payments	Level annual, made at the end of each year.
Term	20 years.

Both the principal and interest portions of the 11th payment are $100.

Question 18

In what range is the initial amount of the loan?

(A) Less than $1,500

(B) $1,500 but less than $1,700

(C) $1,700 but less than $1,900

(D) $1,900 but less than $2,100

(E) $2,100 or more

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Data for Question 19 (5 points)

Data from a two decrement model:

x	$q'^{(1)}_x$	$q'^{(2)}_x$	$q^{(\tau)}_x$	$\ell^{(\tau)}_x$
68	0.05	0.35	-	-
69	-	-	0.80	1,235
70	0.06	0.94	-	-

Question 19

In what range is ${}_{2|}q^{(\tau)}_{68}$?

(A) Less than 0.1175

(B) 0.1175 but less than 0.1185

(C) 0.1185 but less than 0.1195

(D) 0.1195 but less than 0.1205

(E) 0.1205 or more

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Data for Question 20 (3 points)

A pension trust statement reported the following information:

Asset values	1/1/2010	1/1/2011
Book value	$1,325	$1,450
Market value	***X***	1,650

Transactions	2010
Contributions	$250
Interest income	80
Benefit payments	55
Plan expenses	25

During 2010, the net change in unrealized gain/loss was exactly 3 times the net realized gain/loss.

Question 20

In what range is ***X***?

(A) Less than $1,400

(B) $1,400 but less than $1,600

(C) $1,600 but less than $1,800

(D) $1,800 but less than $2,000

(E) $2,000 or more

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Data for Question 21 (3 points)

Terms of a bond:

Date of issue	1/1/2010
Term	20 years
Par value	$1,000
Coupons	6.0%, payable annually, beginning 12/31/2010
Redemption amount	Par value
Yield to maturity	5.0%
Default	Upon default, no further coupons are paid and no redemption amount is repaid. The probability of default in any year is 10%.

Question 21

In what range is the bond's price on 1/1/2010?

(A) Less than $125

(B) $125 but less than $200

(C) $200 but less than $275

(D) $275 but less than $350

(E) $350 or more

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Data for Question 22 (2 points)

The term structure of interest rates is given by the following annual spot rates:

Length of Investment	Spot Rate
1 year	6.0%
2 years	6.5%
3 years	6.8%
4 years	7.0%

X = the present value of payments of $1,000 at the end of each of the next 4 years.

Question 22

In what range is ***X***?

(A) Less than $3,425

(B) $3,425 but less than $3,450

(C) $3,450 but less than $3,475

(D) $3,475 but less than $3,500

(E) $3,500 or more

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Data for Question 23 (3 points)

You are given the following for Smith:

Annual salary as of 1/1/2010: $40,000

Assumed salary increases: 4.0% each year, beginning 1/1/2011

At the end of each month, beginning 1/31/2010, Smith deposits 7.5% of his monthly salary into a fund earning an annual rate of interest of 5.0%.

X = the amount in Smith's fund on 12/31/2039.

Question 23

In what range is ***X***?

(A) Less than $285,000

(B) $285,000 but less than $305,000

(C) $305,000 but less than $325,000

(D) $325,000 but less than $345,000

(E) $345,000 or more

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Data for Question 24 (3 points)

A pension plan has a shortfall of $1,000,000 as of 1/1/2010.

The shortfall is to be amortized in level annual installments over 7 years using the yield curve below, with the first payment due 1/1/2010.

Date	Spot rate
12/31/2010	6.19%
12/31/2011	7.32%
12/31/2012	7.83%
12/31/2013	8.03%
12/31/2014	8.18%
12/31/2015	8.33%
12/31/2016	8.50%

X = the annual amortization payment due on 1/1/2010.

Question 24

In what range is ***X***?

(A) Less than $175,000

(B) $175,000 but less than $180,000

(C) $180,000 but less than $185,000

(D) $185,000 but less than $190,000

(E) $190,000 or more

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Data for Question 25 (3 points)

Data from a multiple decrement table:

x	$q_x^{(\text{termination})}$	$q_x^{(\text{mortality})}$	$q_x^{(\text{retirement})}$
55	0.070	0.025	0.000
56	0.050	0.029	0.000
57	0.030	0.033	0.000
58	0.020	0.037	0.000
59	0.010	0.042	0.000
60	0.000	0.047	1.000

$\boldsymbol{Y}$ = the probability that an employee age 55 retires at age 60.

Question 25

In what range is $\boldsymbol{Y}$?

(A) Less than 0.625

(B) 0.625 but less than 0.675

(C) 0.675 but less than 0.725

(D) 0.725 but less than 0.775

(E) 0.775 or more

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Data for Question 26 (3 points)

Smith (age 60), can retire from Company A between age 61 and 65.

The following rates of retirement are used in the actuarial valuation of Company A's plan:

Age	Rate
61	40%
62	35%
63-64	20%
65	100%

No other decrements apply from age 60 to age 65.

Retirements occur at the beginning of the year.

X = the average assumed retirement age for Smith.

Question 26

In what range is X?

(A) Less than 62.22

(B) 62.22 but less than 62.52

(C) 62.52 but less than 62.82

(D) 62.82 but less than 63.12

(E) 63.12 or more

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Data for Question 27 (2 points)

Smith pays $950 for an investment that returns $500 at the end of year 3, and $700 at the end of year 4.

The purchase price is based on a 2-year spot rate of 5.0% and a 4-year spot rate of 7.0%.

Question 27

In what range is the year 3 forward rate?

(A) Less than 7.0%

(B) 7.0% but less than 7.6%

(C) 7.6% but less than 8.2%

(D) 8.2% but less than 8.8%

(E) 8.8% or more

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Data for Question 28 (3 points)

Mortality is one-year select and ultimate.

$$\ddot{a}_{70} = 9.8269$$

$$\frac{p_{[70]}}{p_{70}} = 1.013$$

Question 28

In what range is $\ddot{a}_{[70]}$?

(A) Less than 9.9270

(B) 9.9270 but less than 9.9370

(C) 9.9370 but less than 9.9470

(D) 9.9470 but less than 9.9570

(E) 9.9570 or more

USE THIS PAGE FOR YOUR SCRATCH WORK

EXTRA BLANK PAPER IS PROVIDED AT THE END OF THE EXAM BOOK

Data for Question 29 (4 points)

An insurance company requires a single premium of $118,218 for an annual 7-year certain and life annuity immediate of ***X*** to Smith (age 60 on 1/1/2010).

The term structure of interest rates is:

Date	Spot rate
12/31/2010	5.0%
12/31/2011	5.0%
12/31/2012	5.0%
12/31/2013	5.0%
12/31/2014	5.0%
12/31/2015+	6.0%

Given the following values:

$${}_7p_{60} = 0.9482$$

Annual interest rate	a_{67}
5.0%	10.8376
6.0%	9.9819

Question 29

In what range is ***X***?

(A) Less than $9,770

(B) $9,770 but less than $9,820

(C) $9,820 but less than $9,870

(D) $9,870 but less than $9,920

(E) $9,920 or more

USE THIS PAGE FOR YOUR SCRATCH WORK

EXTRA BLANK PAPER IS PROVIDED AT THE END OF THE EXAM BOOK

Data for Question 30 (4 points)

Smith (age 65) purchases a 2-year temporary annuity immediate of $100,000 at 1/1/2010.

Unprojected mortality rates are as follows:

x	q_x
65	0.0156
66	0.0176

To compute the single premium for this annuity, the seller uses projected mortality and assumes the following:

Rates of mortality will reduce by 1.5% at 1/1/2011

Interest is 5.0%, compounded annually.

Question 30

In what range is the single premium?

(A) Less than $180,525

(B) $180,525 but less than $181,525

(C) $181,525 but less than $182,525

(D) $182,525 but less than $183,525

(E) $183,525 or more

USE THIS PAGE FOR YOUR SCRATCH WORK

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Data for Question 31 (4 points)

A pension plan provides a single sum benefit of 250% of final pay at retirement.

Smith's annual rate of pay on 12/31/2009 was $50,000.

Assumptions:

Smith will retire on 12/31/2019.

Salary increases are given on January 1 of each year at the annual inflation rate.

Interest rate equals the annual inflation rate plus the real return rate.

Real return rate: 4.0% per year, compounded annually.

There are no decrements prior to retirement.

X= absolute value of the change in the present value of the benefit as of 1/1/2010 if the assumed annual inflation rate were increased from 3.0% to 5.0%.

Question 31

In what range is ***X***?

(A) Less than $300

(B) $300 but less than $600

(C) $600 but less than $900

(D) $900 but less than $1,200

(E) $1,200 or more

****END OF EXAMINATION****